



Strategic Implementation Plan (SIP) for a Community-based Unified Forecast System

NGGPS Global Model Suites Planned for NCEP/EMC Operations

Presented by

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NGGPS Global Model Suites

Project Milestone Accomplishments



- **SIP/EIP project accomplishments towards development of Unified Forecast System to date:**
 - **FV3-Global Deterministic Forecast System (FV3-GFS)**
 - FV3 Dynamic Core adopted into NEMS framework; separated GFS physics using IPDv4; implemented GFDL Microphysics, stochastic physics and write grid component.
 - FV3GFS Beta implementation is on target for Q3FY18 (May 15, 2018), NCEP to run two global models (current operational GFS and FV3GFS Beta) in parallel this summer
 - FV3GFS V1.0 Public Release is planned for March 2018
 - Advanced version of FV3GFS will replace current operational GFS in Q2FY19
 - **FV3-Global Data Assimilation System (FV3-GDAS)**
 - Transitioned the 4D-Hybrid En-Var data assimilation framework for FV3-GFS; configured and optimized the cycled data assimilation experiments including stochastic physics
 - Preparing FV3-GFS for assimilating new satellite datasets (GOES-16, NOAA-20)
 - Preparing FV3-GDAS to accommodate increased vertical resolution and higher model top for Q2FY19 implementation



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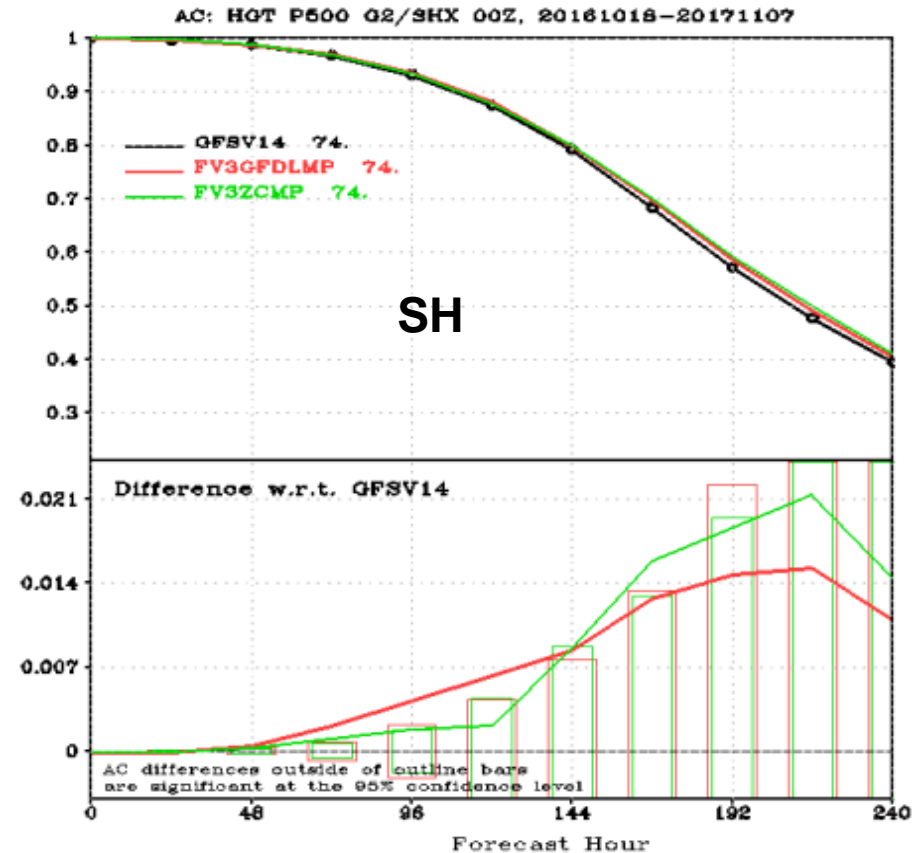
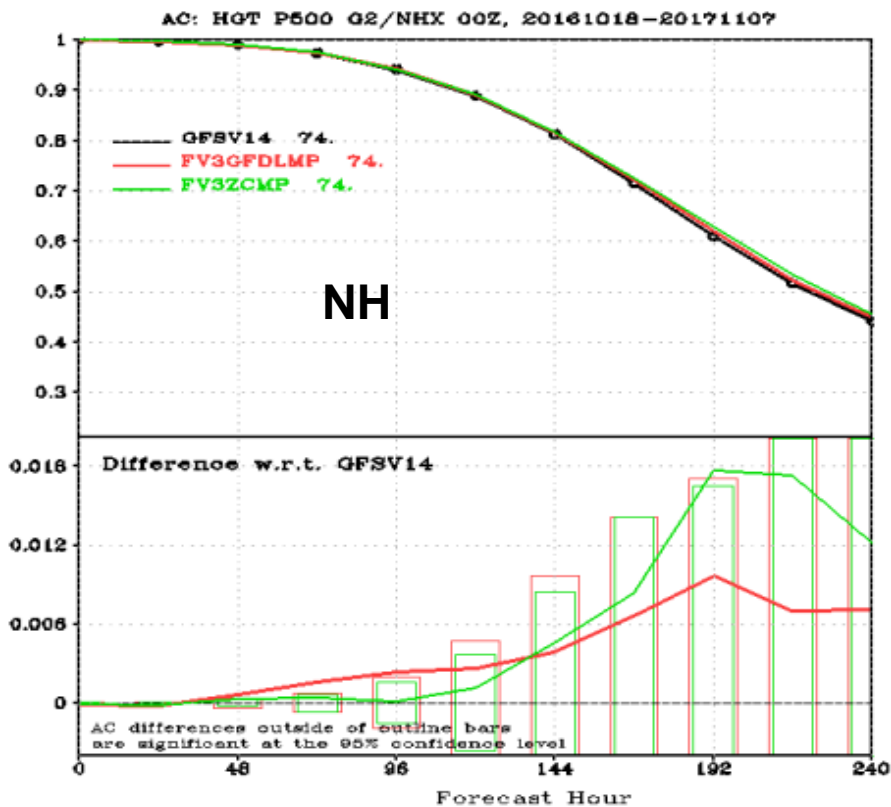
Project Milestone Accomplishments



- **SIP/EIP project accomplishments to date:**
 - **FV3-Global Sub-Seasonal Ensemble Forecast System (FV3-GEFS)**
 - Finalizing FV3GEFS Reanalysis and Reforecast Configurations
 - FV3GEFS Reforecasts and operational implementation in Q4FY19 will include extension to weeks 3&4 using 2-Tier SST approach and stochastic physics
 - Planning for increased ensemble membership and increased forecast model resolution
 - Global Wave Ensembles will be absorbed by GEFS in operations.
 - NGAC chemistry component will be integrated into GEFS Control Member
 - **FV3-Seasonal Forecast System (FV3-SFS)**
 - Benchmarked UGCS GSM+MOM5+CICE5 for sub-seasonal forecast evaluation
 - Testing GSM+MOM6+CICE5 for sub-seasonal forecast evaluation
 - Developing FV3+MOM6+CICE5 coupled system using NEMS/NUOPC mediator.
 - GFDL to support benchmarking FV3+MOM6+SIS2 coupled system using FMS
 - Planning on developing unified data assimilation for marine components including ocean, ice and waves using Marine JEDI



NGGPS Global Model Suites Accomplishments



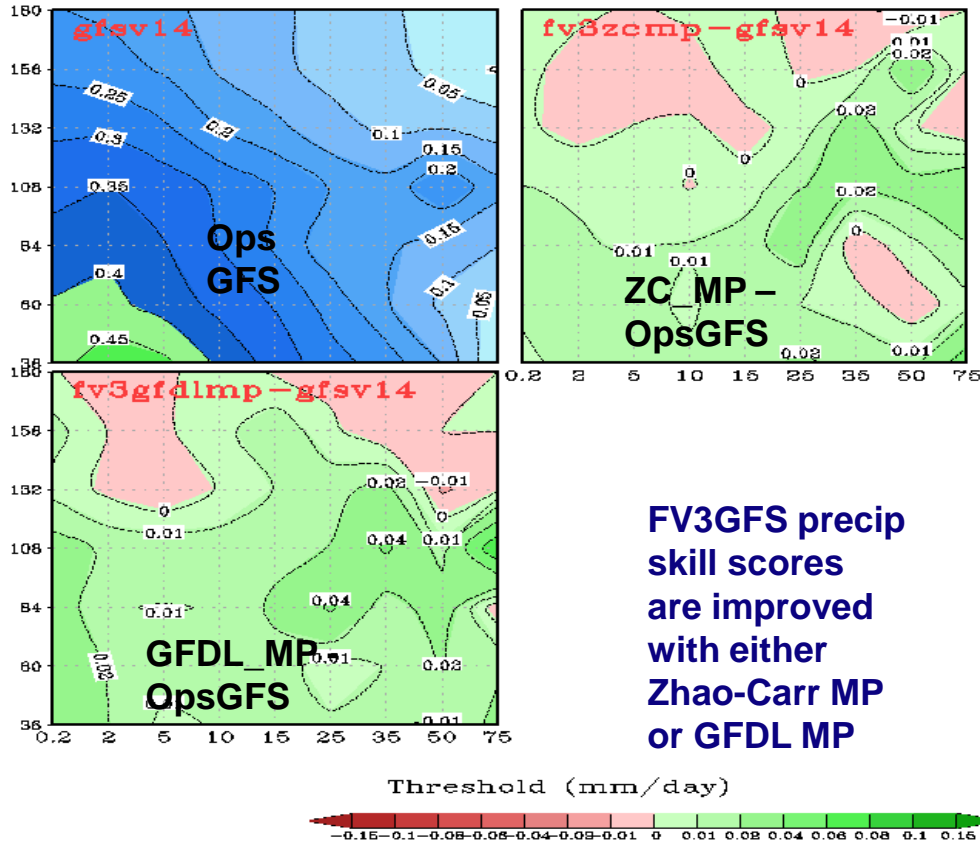
500-hPa HGT ACC



NGGPS Global Model Suites Accomplishments

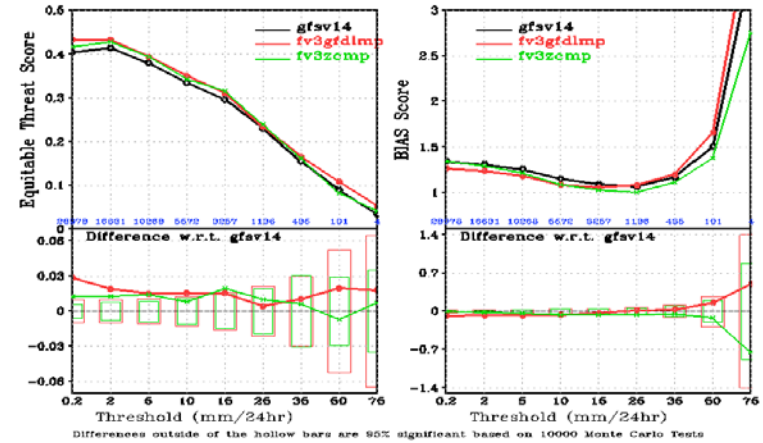


CONUS Precipitation Equitable Threat Score
18Oct2016-01Nov2017 00Z Cycle

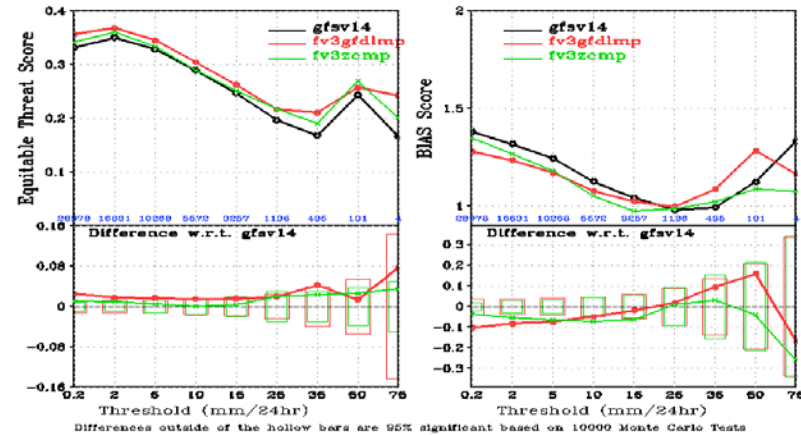


FV3GFS precip skill scores are improved with either Zhao-Carr MP or GFDL MP

CONUS Precip Skill Scores, f36-f60, 18Oct2016-01Nov2017 00Z Cycle



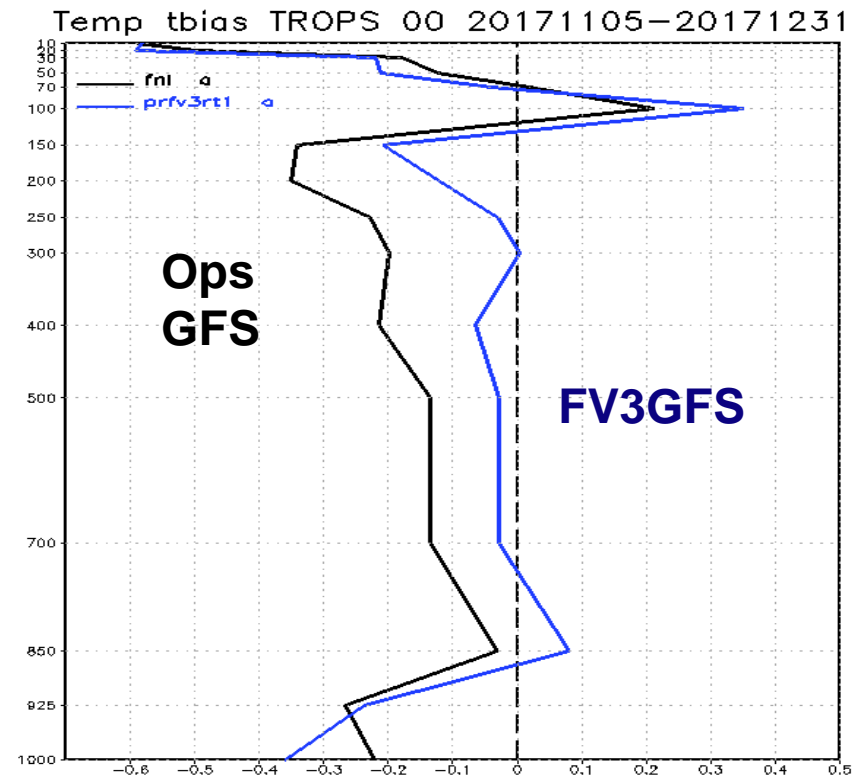
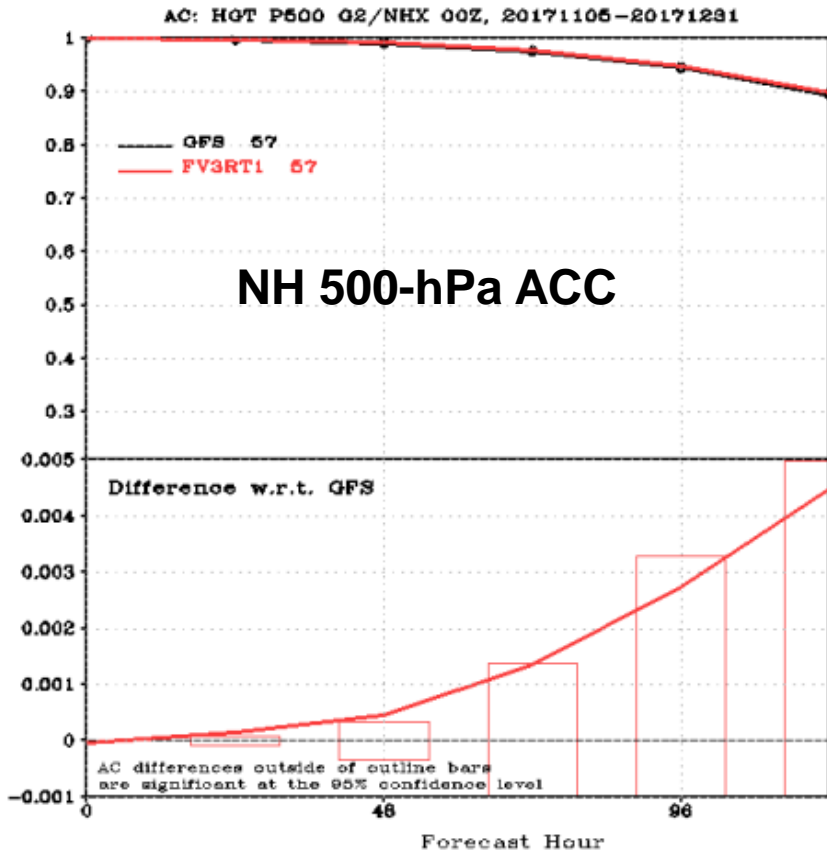
CONUS Precip Skill Scores, f64-f108, 18Oct2016-01Nov2017 00Z Cycle



CONUS Precip ETS and Bias Scores



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<http://www.emc.ncep.noaa.gov/gmb/emc.glopara/vsdb/prfv3rt1/>

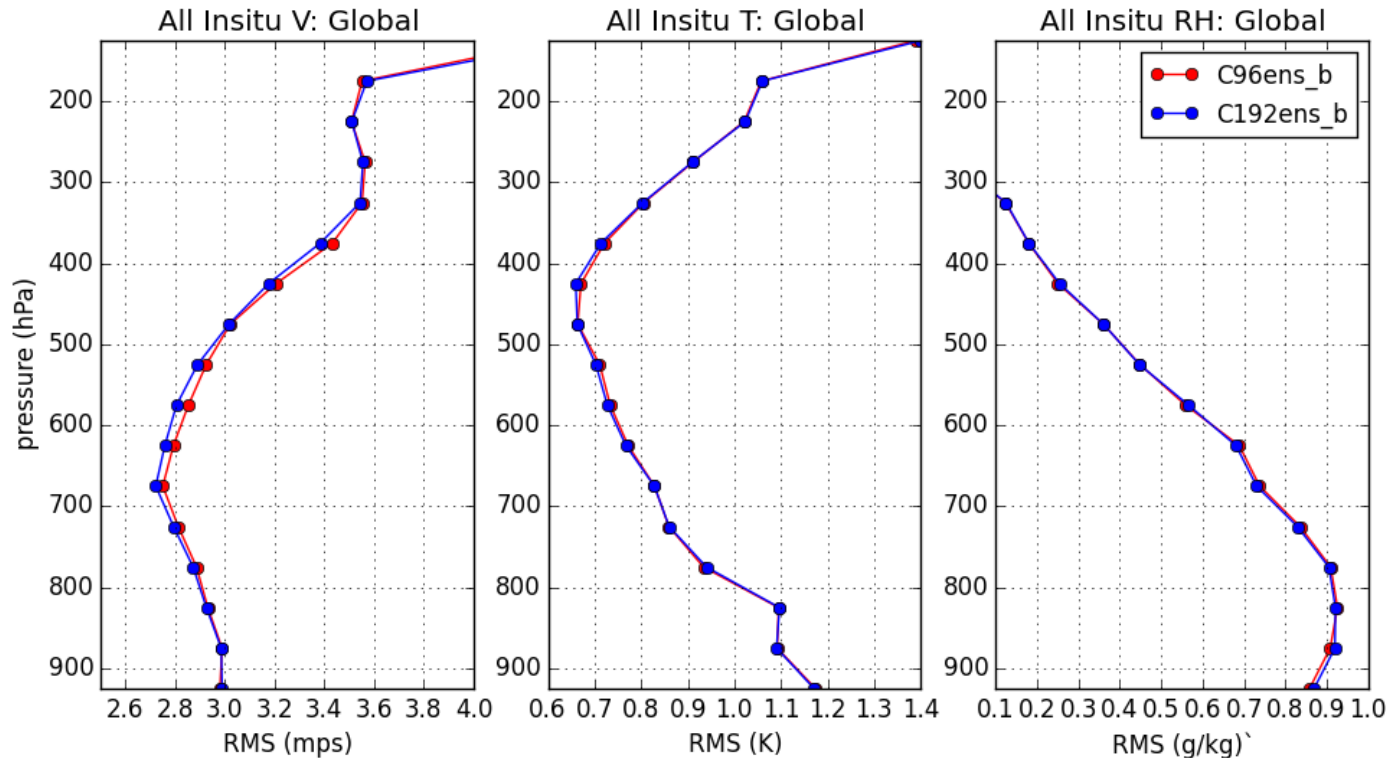
Real-time cycled experiment with data assimilation



NGGPS Global Model Suites Accomplishments



RMS O-F (2016010400-2016011200)



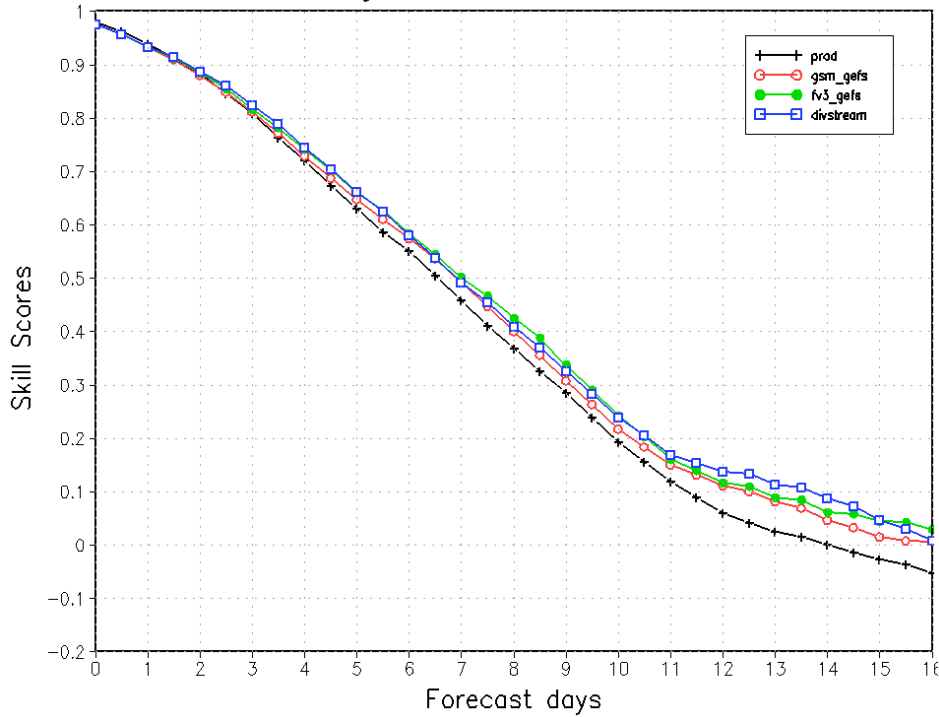
**Dual resolution C384/C192 vs C384/C96
same analysis and forward operator grid (C192)**



NGGPS Global Model Suites Accomplishments

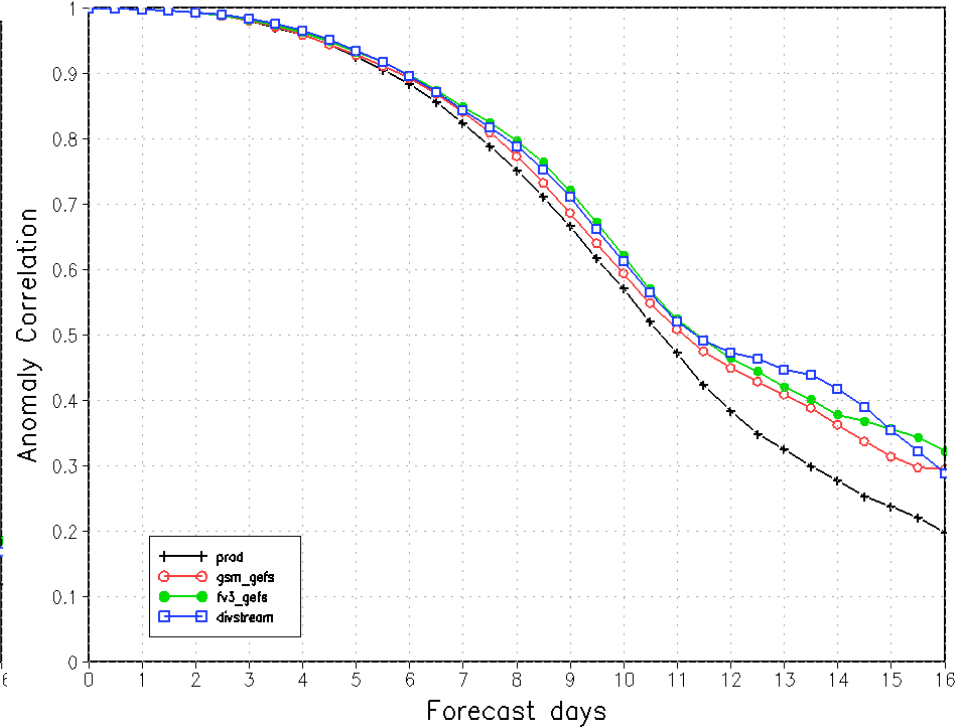


Northern Hemisphere 500hPa Height
Continuous Ranked Probability Skill Scores
Average For 20161001 – 20161010



FV3GEFS 500 hPa CRPS

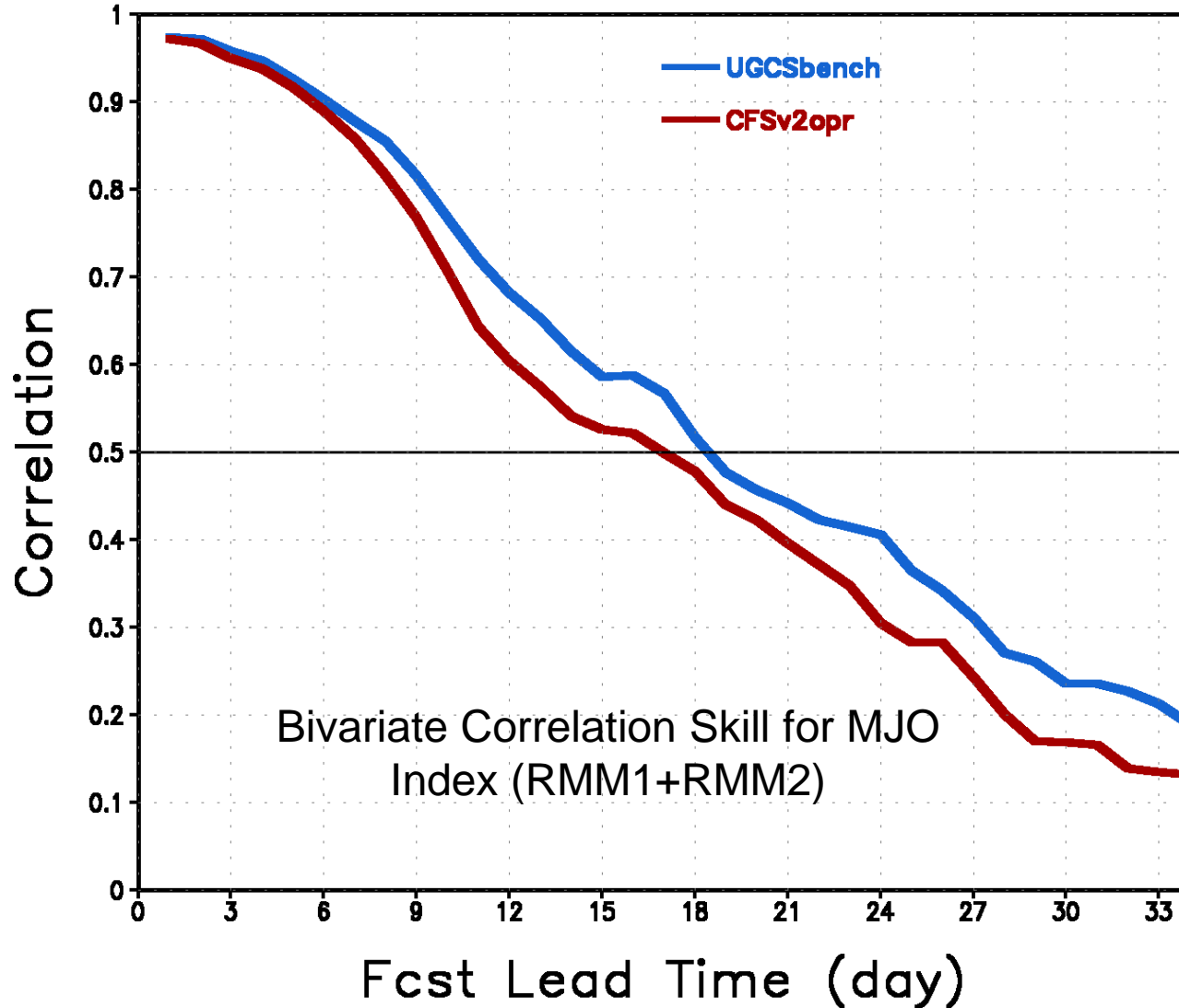
Northern Hemisphere 500hPa Height
Ensemble Mean Anomaly Correlation
Average For 20161001 – 20161010



FV3GEFS 500 hPa ACC



NGGPS Global Model Suites Accomplishments





NGGPS Global Model Suites Project Issues



- **SIP project issues:**
 - **FV3-Global Deterministic Forecast System (FV3-GFS)**
 - COMPUTATIONAL RESOURCES FOR Q2FY19 IMPLEMENTATION
 - Advanced physics development and testing at risk
 - Need accelerated development of CCPP, CROW, and MET+
 - Incomplete code documentation; lack of adequate training
 - **FV3-Global Data Assimilation System (FV3-GDAS)**
 - Increased vertical resolution and higher model top requires finalizing advance model configuration
 - Need accelerated development of JEDI
 - Stratospheric biases are still a concern
 - COMPUTATIONAL RESOURCES FOR Q2FY19 IMPLEMENTATION



NGGPS Global Model Suites Project Issues



- **SIP project issues:**
 - **FV3-Global Ensemble Forecast System (FV3-GEFS)**
 - COMPUTATIONAL RESOURCES FOR Q4FY19 IMPLEMENTATION
 - Stochastic physics and ensemble spread
 - Physics mods for sub-seasonal forecast extensions
 - Extremely slow progress on FV3 based coupled system development
 - **FV3-Seasonal Forecast System (FV3-SFS)**
 - Extremely slow progress on FV3 based coupled system development
 - Need accelerated development of Marine JEDI
 - Aerosol model development and data assimilation at risk
 - Lack of adequate resources



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Team Coordination and Dependencies

- **General Team Coordination:**

- Multiple meetings each week within EMC and with core partners
- Weekly FV3GFS and FV3DA technical meetings
- Bi-weekly Advanced Physics and Dynamics meetings
- Regular interactions with GFDL, NASA/GMAO, GMTB and CGD
- Regular review of global modeling projects and coordination among various projects
- Content and Project management through Vlab Redmine and Wiki/Forums

- **Dependencies**

- Deliverables from almost all SIP WG and EIP Projects
- JEDI, CROW, MET+, Infrastructure, Software Architecture, code management and governance
- Documentation and training